SLUMLORDS

Aerospace Power in Urban Fights

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About the Author

Captain Troy S. Thomas is an intelligence officer currently serving as an instructor of political science at the United States Air Force Academy. Capt Thomas has participated in Operations SOUTHERN WATCH and VIGILANT WARRIOR in Southwest Asia. He also served in the Pacific Theater with 7th Air Force, Osan Air Base, Republic of Korea. His operational experience was interrupted for tours of duty on the Air Staff and in the Office of the Secretary of Defense, Pentagon. He received a Masters Degree in International Relations from the University of Texas, Austin, and a Masters in Organizational Management from George Washington University, Washington, DC. His teaching and research emphasizes aerospace power, conflict and peace studies, Middle East and Southeast Asian studies, organizational leadership, and cognitive leadership skills.

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Airmen know the urban fight. Airmen of 5th Air Force coordinated Marine Corsair strikes in the campaign for Seoul, Korea, 1950. Airmen of 7th Air Force struggled through gloomy skies to put 500 lb bombs on North Vietnamese Army positions in the Citadel of Hue, Vietnam, during the Tet Offensive, 1968. Special Operations airmen directed their Vulcan and Bofors cannons against Panamanian Defense Forces during Operation JUST CAUSE, 1989. Airmen of the Central Command Air Forces applied decisive force in the streets of Baghdad, Kuwait City, and Khafji during the Persian Gulf War, 1991. 51st Fighter Wing airmen from Osan Air Base, South Korea, are ready to halt North Korean forces in the urbanized environs of Seoul. Airmen have known urban warfare since their birth. Past participation, however, does not mean current readiness to effectively apply force across the range of potential urban combat operations as a critical member of the joint force. For this, airmen must renew and overhaul their perspective on the urban fight.

The changing character of American warfare necessitates this new look. All services are engaged in the transformation to a more expeditionary, technologically sophisticated force that is capable of achieving national objectives without destructive, bloody force-on-force engagements.[1] This does not imply a sterile fight. Although the goal may be to minimize destruction and casualties, dominance of the battlespace and the achievement of national objectives will never come without shedding blood or heroic effort. With this in mind, the "new American way of war" applies our strengths against adversary vulnerabilities to directly attack the enemy's centers of gravity (COGs) without unnecessary loss of life.[2] Among our many joint force strengths, aerospace power stands out as highly relevant to this "asymmetric force

strategy." US aerospace forces are unrivaled in our ability to maneuver and apply precise force throughout the battlespace.

The implications of this "asymmetric force strategy" for urban warfare are substantial. First, the urban battlespace is also a home, a church, a seat of government, a school and a market…we do not destroy a city to save it![3] The city is a system and even precise force application may induce an effect that undermines the viability of the urban battlespace and its residents. Second, and closely related, we must understand that **how** we fight impacts the endgame. Our ability to provide for the "security of former adversaries and other basic human needs" of noncombatants will often be essential to preclude the "resurgence of hostilities, enhance public support and ensure the security of military operations."[4] Third, how we fight will be displayed to the world and influenced by media exposure. Often coined the "CNN effect," media coverage in urban areas is far more pervasive than in rural areas, and as evidenced during operations in Baghdad and Belgrade, the effects of aerospace power have a global, critical audience. Finally, our enemies are adaptable.[5] That is, they are complex, adaptive organisms that may respond to our aerospace advantage by shifting to an urban battlespace, believing this will constrain our forces, negate our asymmetric advantages and generate the vicious fight they mistakenly believe Americans will avoid at all costs.[6] While the urban battlespace will certainly impose constraints and generate challenges, this paper argues that it need not mute our advantages or necessitate the bloodbaths of Hue or Mogadishu.

This paper is for airmen. The objective is to educate and guide airmen in their thinking about applying aerospace power in urban warfare.[7] It is not strategy, nor is it tactics, techniques and procedures (TTPs). Rather, it feeds both with an operational focus on *control*—the ability to dominate an adversary's influence over strategic outcomes.[8] It acknowledges the good work

begun on tactics and technologies in recent years by the joint force, but bemoans the persistent inadequacy of operational concepts. Along these lines, it endorses the view that the historical shortcoming of aerospace power has been a "failure to properly analyze the mechanism that ties tactical results to strategic effects."[9] It is founded on the fundamental reality that urban warfare is not a mission. It is terrain—complex and demanding. It is a battlespace with two uniquely challenging components: people and infrastructure. It is a battlespace whose relevance is a function of US national objectives and campaign strategy. It is a battlespace that will remain pertinent in the future of conflict.

This effort begins in Section One by arguing the relevance of the urban battlespace to future conflict. In Section Two, the character of urban warfare and the warfighting rules it insists on are examined with lessons for airmen who seek to fight in the downtowns of the Global North or the slums of the developing South. Section Three offers a novel framework for airmen to assess the urban battlespace that has real implications for the operational employment of aerospace power. Section Four outlines keys for crafting operational art that fuses principles of war and military operations other than war (MOOTW). Section Five provides an introduction to operational effects that airmen can accomplish across the spectrum of conflict through aerospace power functions. As a result of this effort, all airmen should be left with an understanding of why, how, where and to what end they will fight. They should be better prepared urban fighters as a member of the joint force.[10]

ONE	URBAN FUTURE

Airmen will fight in cities. The urban battlespace is ever-present in the annals of military history and its importance has not declined in the post-World War II era. From the siege of Aachen to the strategic attacks against Belgrade, cities persist as integral to operations across the spectrum of conflict. This is despite a historical aversion to urban combat, originating with Sun Tzu's maxim to "attack cities only when there is no alternative" and continuing in contemporary debate with an emphasis on strategist Liddell Hart's hallmark indirect approach.[11] Recognizing that an avoidance or indirect strategy may be most appropriate given national objectives, this analysis embraces a future in which strategic objectives may necessitate urban combat for two principle reasons: *urbanization* and *strategic value*.

Urbanization

Urbanization has important implications for warfare, but rapid urban growth does not alone make the case for the inevitable, increasing frequency of urban combat as many argue. Urban growth and the reasons for it are not new. People have been migrating to cities for centuries, primarily for socio-economic reasons. According to the World Resources Institute (WRI), "life expectancy is usually significantly higher and infant mortality significantly lower in urban areas overall than rural areas" due in part to increased access to water, sanitation, health care, and education.[12] In the industrial and post-industrial era, cities have become the center for economic growth. As of 1999, 76% of the populations of the advanced countries in the Global North lived in urban areas.[13]

Urban growth becomes a source for instability and potential conflict when its rate surpasses the capacity of government to provide for the basic needs of its residents. The failure

of a state is often first seen in its decaying cities.[14] Trends in urbanization do suggest this is occurring in the developing, Global South today. According to the United Nations Population Division (UNPD), virtually all the population growth expected from 2000-2030 will be in urban areas: 2 billion persons![15] Of this, 1.9 billion persons will be added to the urban cities of the developing world. The scale is unprecedented with roughly 150,000 people added to cities every day.[16] City governments and economies cannot keep up. Unemployment in much of the Global South exceeds 50%; subsistence activities, or informal jobs make up 75% of urban employment in sub-Saharan Africa and 30-50% in Latin America.[17] While poverty traditionally exists principally in rural areas, we are witnessing a shift to urban areas that is particularly devastating for women, children and the elderly. According to World Bank estimates, half of all children born in urban areas this year enter into poverty.[18] In the Global South, 1.3 billion people survive on less than $1 a day and women die during childbirth at rates up to 100 times that of the developed, Global North.[19]

Rapid urban growth in excess of government capacity does result in civil strife, possibly conflict, and certainly humanitarian crises. As a contributor to a failing state, rapid urbanization is a principal causal factor for the dramatic increase in civil war over the past decade. When combined with increasingly nationalistic ethno-political groups, the result is a watershed change in the nature of armed conflict. From 1989 to 1998, 107 internal conflicts have erupted in comparison to only 7 new inter-state conflicts.[20] This is almost as many as occurred from the Concert of Europe in 1816 through the end of the Cold War in 1989: 124.[21] The trend continues with 32 civil wars raging as the century closed.[22] The Global South has become the world's killing fields. Over 90% of the inter- and intrastate conflicts and 90% of the casualties in the past 50 years have been in the Global South.[23] The existence of civil wars is of such

consequence to airmen because of the shift in our national security strategy to increased emphasis on humanitarian interests and an increasing global consensus on the moral imperative of intervention when crimes against humanity are underway.[24] The US apologized for not acting during the Rwandan genocide of 1994…the US championed intervention in Bosnia, Kosovo, and East Timor.

Potentially more important for airmen is the way urbanization is occurring, which has implications for the character of the battlespace. The most dramatic growth is seen in the "million cities," or those with populations between 1 and 10 million. By 2015, there will be 516 of these cities compared with only 270 in 1990.[25] Because these cities are not among the handful of 10 million plus resident mega-cities (23 in 2015), they are not always getting priority for limited state resources.[26] Moreover, the growth is not occurring in the city core, but along the fringes, resulting in so-called "unintended" urban slums that are beyond the reach of government services and control. As seen on the periphery of Dehli, Karachi, or Cairo, this new urban sprawl constitutes its own highly complex system whose links to the industrial core are minimal at best. In essence, they exist next to each other, but rarely interact. Therefore, rapid urbanization in developing countries results in a battlespace that actually becomes increasingly less knowable and less susceptible to a nodal approach to warfare.

Strategic Value

Airmen will fight in the Global South due in part to the impact of urbanization, but this does not directly translate to fighting in urban areas as many theorists assert. Rather, airmen will apply aerospace power in urban areas because cities have strategic value. As appropriately put by leading RAND analysts for Project Air Force, many objectives "cannot be achieved without

controlling cities (or parts of them) for some period of time." [27] Urban strategic value is a function of location, symbolism, and power.[28]

Cities are strategically located. They exist in areas that sustain populations due to the proximity of resources and lines of communication (LOC) that are vital for economic prosperity. Istanbul straddles the Bosporus Strait, Tashkent bridges Asia along the ancient Silk Road, Seoul hugs the Han River, Buenos Aires overlooks the Rio De La Plata and Singapore guards the Strait of Malacca. As hubs for air, land and sea travel, these cities and others are hard to avoid. In many cases, they simply cannot be bypassed, particularly if operations require the movement of military and/or humanitarian supplies into and throughout a region. For example, the port in Mogadishu was essential for the dissemination of humanitarian relief during Operation RESTORE HOPE in Somalia.[29]

Cities are symbolically important. They are symbols of national identity that transcend their socio-economic role. The symbolism derives from the cultural, religious, political, and social importance of a city—it is psychological, implying the salient role of information operations in the urban fight. Given the link to identity, control often becomes the object of struggle even when the costs are excessive. US Marines and South Vietnamese soldiers fought desperately to prevent the fall of Hue, which was the cultural and educational heart of Vietnam. The Russians fought twice for Grozny, Chechyna, at great cost because it was in part the symbol of Chechen rebel resistance. Jerusalem has been at the locus of three wars and remains at the crux of the Middle East peace process because of its religious and cultural value. The symbolism draws in conventional forces in wars between states as well as non-state actors during civil wars. Insurgents, terrorists and criminals thrive in the symbolically target rich urban

environment. Some of the darkest days of the conflict in Northern Ireland involved the Irish Republican Army (IRA) bombing campaign in London during October 1981.[30]

Most importantly, cities are centers of power. They are often the seat of government, the commercial epicenter, the industrial backbone, and the information hub for states, regions and even non-state actors. Their control brings ready access to resources, technologies, information, and the population. As such, urban systems, or elements of the system qualify as Clauswitzian COGs, which the joint force and airmen define as "those characteristics, capabilities, or localities from which a military force [adversary] derives its freedom of action, physical strength, or will to fight."[31] Control of urban areas often translates into control of the country. Over twenty years of conflict in Afghanistan has consistently focused on control over key cities, particularly Kabul. US military interventions have often focused on cities, including Panama City, Kuwait City, and Port-au-Prince—the control of which would essentially result in control of the state.[32]

Trends in urbanization and the strategic value of cities interact to support the conclusion that airmen will fight in urban areas, but not as a mater of fate. It is a choice linked to national objectives and campaign strategy. Our "adaptive enemies" will be drawn to urban areas for similar reasons. Such adversaries will not necessarily gain an advantage by settling into urban slums due in part to the same factors impacting US forces: the nature of urban warfare and the character of the battlespace.

The urban fight will challenge the courage and skill of airmen. Urban warfare emerges across the spectrum of conflict and its nature can leave the unprepared warrior overwhelmed. For aerospace power to be "war-winning" in the urban fight, airmen must understand the nature of urban combat as a subset of urban operations characterized by demanding warfighting rules. Airmen prevail in this battlespace when the objective is obtained and the mission is accomplished in a manner consistent with the "new American way of war." Airmen should know:

Urban warfare is a subset of urban operations, which are a subset of all military operations![33]

Airmen are engaged in urban warfare when two criteria are met. First, they are planning and executing operations in an area dominated by man-made features and noncombatants.[34] Sarajevo counts…the Serengeti does not. Second, they are applying lethal and non-lethal aerospace power against an adversary who is often bent on their elimination. Notably, the latter criteria highlights that non-lethal force is a relevant component to urban warfare, particularly as a means to enhance lethality or when measured force is required to effect the adversary without unnecessary collateral damage or civilian casualties. For example, an EC-130H Commando Solo out of Davis-Monthan AFB can be used to jam commercial broadcasts and radio nets as in Panama City.[35] This affects the enemy's ability to conduct coordinated actions, leaving units isolated and more susceptible to termination. The same capability can be used against unconventional forces during humanitarian interventions. During the 1994 genocide in Rwanda,

armed Hutu gangs swarmed the streets of Kigali hacking Tutsis, cheered and guided by government-sponsored radio broadcasts—shut down the broadcasts and slow their momentum.

The <u>Handbook for Joint Urban Operations</u> offers a cumbersome definition of joint urban operations as

> joint operations planned and conducted across the range of military operations on or against objectives on a topographical complex and its adjacent terrain where man-made construction and the density of noncombatants are the dominant features.[36]

Simplifying, airmen are conducting urban operations when they are planning and executing aerospace power functions in a battlespace dominated by man-made features and noncombatants. The joint definition fails to recognize that physical presence is not necessary for a warrior of any service to be engaged in urban operations. The airmen of the Space Warfare Center at Shriever AFB were engaged in an urban fight when they performed surveillance in support of air strikes on Belgrade in Operation ALLIED FORCE. The airmen of the 352nd Special Operations Group, RAF Mildenhall, United Kingdom, engaged in urban combat when they mission planned the non-combatant evacuation operation (NEO) from Monrovia, Liberia, in 1996.

Urban operations are a subset of all military operations because they are an environment—not a single point along the spectrum of conflict. As fittingly argued by the Assistant Commandant of the Marine Corps, General Terrence Drake, "the two distinguishing features of cities, people and infrastructure, will have equal influence on military activities in major theater war (MTW) and operations other than war (OOTW)."[37] This is similar to arguing that jungle operations has distinguishing features regardless of whether the mission includes more typical combat operations as search and rescue or typical noncombat operations as support to insurgencies. While many urban operations since 1990 have originated as MOOTW, aerospace doctrine correctly asserts, "a distinct characteristic of MOOTW is the ever-existing

possibility that any type of MOOTW may quickly change from noncombat to combat."[38] Situations deteriorate! Airmen of Joint Task Force—Southwest Asia (JTF-SWA) participating in the NEO in Sana'a, Yemen, during that impoverished state's 1994 civil war, had to anticipate the potential for a hostile response to airlift operations. The heavy presence of known anti-US terrorist organizations with access to MANPADS and anti-aircraft artillery could not be ignored even though the operation was well intentioned. One lesson of our expeditionary experience is that US military presence is not always perceived as we intend.

While the relevant aerospace power functions and the level and scope of required force may shift across the spectrum of conflict, most urban combat situations will share several operationally significant characteristics. These characteristics reflect the lessons of history that inform current dialogues on how to prepare for and execute the urban fight. The Marine Aviation Weapons and Tactics Squadron One (MAWTS-1) in Yuma, AZ, conducted an impressive study of 22 modern urban battles from which they draw numerous historical lessons.[39] These lessons and others are summarized in the draft of JP 2-06, <u>Joint Urban Operations</u>:

- Cities reduce the advantages of the technologically superior force
- Ground operations are manpower intensive
- Ground operations become decentralized
- Operations are time-consuming
- Physical terrain changes effects of weapons and munitions
- Combat operations result in large number of civilian casualties
- Urban operations are conducted under more restrictive constraints
- ROE effectiveness is related to friendly casualties
- Urban areas can provide advantages to defenders, insurgents, and terrorists.[40]

As aptly put by the MAWTS-1 aviators, "lessons learned impart the notion of a transcendent, universal truth…lessons learned may not be valid when applied outside of their operational context."[41] Airmen must resist the temptation to see urban warfare as strictly a low tech, small-unit, ground force intensive fight. As a vital member of the joint force, airmen should champion

the application of aerospace power in a way that overcomes the challenges and rewrites many of these controversial lessons.

Warfighting Rules

Of lessons pertaining to the nature of urban warfare, *sensitivity to civilian casualties* and *Restrictive Rules of Engagement (ROE)* are of particular relevance to airmen as urban warfighting rules.[42] Their importance derives from our emerging asymmetric force strategy and the concentration of people and property that makes force application far more complex in terms of the Laws of Armed Conflict (LOAC).[43] LOAC are based on four core principles: discrimination, military necessity, unnecessary suffering and proportionality.[44] Notably, these principles are devalued when US vital interests are at stake.[45] That is, when the very survival of the nation is on the line, Americans will revert to our historical preference for total war.

Modern military operations are planned and executed with careful consideration of the potential for civilian suffering as demanded by LOAC principles, numerous international agreements and the maxim previously offered: how we fight can decide victory. In the urban fight, the density of people and property magnifies caution. The degree to which the American people support minimizing noncombatant casualties is less a function of international law then it is of perceptions. As during Vietnam, Americans will protest noncombatant deaths that result from indiscriminate force and/or an uncertain cause.[46] The opposite is also true, particularly when American pride has been damaged or survival is on the line. Immediately following the death of 18 American warriors during the fight in the bowels of Mogadishu, October 1994, numerous polls indicated that Americans actually supported increasing our commitment.[47] A further reason for this sensitivity is that aerospace power is often applied as part of a coalition force, whose members are equally and sometimes more sensitive to mitigating unnecessary

suffering. Although sensitivity can constrain action by US forces, it also argues for the prominent role of aerospace power where our core competencies, particularly of precision engagement, rise to the occasion.

Restrictive ROE also manifest from LOAC and have constrained military operations for several decades…no change is on the horizon. In the urban battlespace, the ROE are primarily intended to minimize civilian suffering and collateral damage—we do not destroy the city to save it. Rules dictates when, where, against whom and how force can be used.[48] They are intended to embrace our national policy goals, mission requirements, and LOAC. During Operation DESERT STORM, the air campaign known as INSTANT THUNDER embraced "absolute minimum of civilian casualties and collateral damage" as part of its concept of operations.[49]

The implications for airmen are critical. First, restrictive ROE can increase risk, chiefly at the tactical level. For example, the airmen of Operation DELIBERATE FORCE were initially required to make at least one dry pass over the target before releasing a maximum of one bomb, which would have left them predictable and vulnerable…this restriction was eventually removed.[50] Initial results from a year-long urban close air support (CAS) study at the Urban CAS Facility known as "Yodaville," Marine Air Corps Station (MACS) Yuma, reveals that dry runs to verify target identification create an unacceptably high risk to aircraft.[51] A reduction in risk to airmen can increase the chance of collateral damage. Given the extreme difficulty of identifying hostile forces from a standoff orbit in complex terrain, even highly skilled rotary and fixed-wing pilots placed ordinance off the mark, striking dangerously close to friendly positions and impacting unintended targets.[52]

ROE impact targeting in another way. The decisiveness of aerospace power is directly related to our ability to attack targets to achieve effects that accomplish command objectives.

Target selection is a rigorous process intended to achieve maximum effect with economy. A pervasive feature of conflict since Vietnam is close scrutiny of target lists prior to inclusion in the Air Tasking Order (ATO), particularly when the target is located in the urban battlespace. During Operation ELDORADO CANYON in 1986, terrorist-related targets near Tripoli, Libya, had to receive redundant identification to avoid collateral damage.[53] Sensitivity and associated ROE increasingly mean airmen must seek senior officer approval not only for the targets on the ATO, but before dropping bombs on emerging targets even while in the midst of fierce combat. The commanding officer during Operation JUST CAUSE required at least Major General or above approval before any bomb could be dropped on a target in Panama City.[54] ROE for the planned invasion of Port-au-Prince, Haiti, required all air strikes to be direct and observed.[55] Interestingly, restrictions often change during the conflict even when there is no public pressure to be "extra careful." After the Al Firdos bunker was inadvertently struck in downtown Baghdad during Operation DESERT STORM, Chairman of the Joint Chiefs of Staff, General Colin Powell, required all Baghdad targets to be personally cleared.[56] Images of screaming children in Baghdad or a rubbled Chinese Embassy in Belgrade only serve to escalate the restrictions. Similar pressures on the work of airmen do not exist when the image is of displaced desert sand or shredded trees in the jungle.

Aerospace power is engagement and war-winning when it makes a "decisive contribution to successful military operations and the attainment of rapid and low cost victory."[57] The challenge of victory for airmen and the joint force is compounded by the constraining warfighting rules and the harsh realization that our enemies abide by no such rules. Indeed, our enemies are known to exploit civilians and protected targets to their short-term military advantage. Panamanian soldiers used the Santo Tomás Hospital for sniper activity.[58] Somalia

technicals commingled with women and children on Black Sunday. Saddam Hussein temporarily used "guests" as human shields and his forces hid Silkworm surface-to-surface missiles in a Kuwaiti school.[59] These same constraints, however, herald the need for aerospace power as echoed in the Air Force Vision 2020, <u>Global Vigilance, Reach and Power</u>:

> "We'll target with such speed and precision that we'll deny an enemy the traditional sanctuaries of night, weather, and terrain. With advanced sensors and a range of precise weapons, from large to very small, we will be able to strike effectively wherever and whenever necessary with minimal collateral damage."[60]

THREE	**URBAN BATTLESPACE**

Airmen must have battlespace awareness for operational success. Understanding the urban setting is tough given the complex and diverse nature of the environment. Building on the analysis of warfighting rules in the previous section, the purpose here is to provide a simplified, innovative framework for understanding the urban battlespace that goes beyond the purely descriptive. The goal is a framework that embraces the diversity of cities, but in a manner that has actionable, operational significance for airmen. The framework embraces a systems approach in which sub-systems interact to create a continuum with *modern* cities at one end and *primitive* cities at the other. When crossed with the type of threat faced by airmen, the result is a framework with real consequences for the way we fight. The analysis in this section explains the elements and value for airmen of this framework shown as Figure 1.

Battlespace Framework	**CITY TYPE** Figure 1	
	Modern	*Primitive*
THREAT TYPE *Conventional Force*	North Korean Army in Seoul Chinese People's Liberation Army in Taipei	Russian Army in Baku Indian Army in Karachi
Unconventional Force	Leftist guerillas in Bogota Islamic Insurgents in Bishkek	Technicals in Mogadishu West Side Boys in Free Town

System Approach

The urban battlespace is a system.[61] Systems thinking is the "discipline of seeing wholes."[62] We do not understand the enemy by examining his boots. With this thinking, cities can be understood as a set of interrelated sub-systems, or parts, that interact as a whole city that is interdependent with the environment–cities are not islands. Rather, they are connected to a surrounding mixed terrain or rural setting through permeable boundaries and LOC. The systems

approach orients airmen to relationships and patterns of activity rather than static objects or individual events in time and space.[63] It also recognizes that relationships intersect at key nodes. For example, an enemy force has leadership and fielded forces. Each is a node that can be separately targeted with aerospace power. They also have a relationship that can be exploited by discovering the medium and content of their interaction. The more decentralized and unconventional the enemy, the more difficult it will be to discern the nodes. The problem is compounded in the unintended, sprawling peripheries. The systems approach is essential given the complexity of the urban battlespace. It allows us to see the "structures" that underlie seemingly complex, or even chaotic, situations.[64] The dynamic complexity of cities often means that relationships between cause and effect are difficult to discern, and the effects of aerospace power may be delayed in time.

Urban Space

The urban system is unique in that it consists of five dimensions, or spaces. First, there is the airspace above the ground that is usable to aircraft and aerial munitions.[65] Second, there is the supersurface space, which consists of structures above the ground that can be used for movement, maneuver, cover and concealment and firing positions.[66] Snipers hide in the upper stories of windows. Wires can be strung across buildings to disable aircraft. For airmen, the supersurface warrants special consideration as a primary location for weapons such as surface-to-air missiles (SAMs) or anti-aircraft artillery (AAA). The green and orange tracers of AAA over Baghdad during Operation DESERT STORM provide strong visual evidence. Structures also channel or restrict movement at the surface. Third, the surface space consists of the exterior areas at the ground level to include streets, alleys, open lots, parks, etc.[67] The fourth space is the subsurface, or subterranean level, consisting of those sub-systems existing below ground to

include subways, sewers, utility structures and others.[68]   Although often overlooked, the subsurface space is more often exploitable because these sub-systems exist as part of a city's planned infrastructure; therefore, they have relationships and nodes that are knowable. The fifth domain is the information space. Here, information is collected, processed and disseminated throughout the city. Information can be collected by sophisticated sensors or wide-eyed children and disseminated by cellular phones or beating drums.[69] In Mogadishu, communication between clan members was often conducted by the pounding make-shift drums.

Urban System

Distinctions between *modern* and *primitive* cities are a function of the character of three sub-systems: *physical*, *functional* and *social*. All can exist in the five urban spaces. The physical sub-system is the urban skeleton; the functional sub-systems are the organs; and the social sub-system is the flesh.[70] Each sub-system has implications for aerospace power.

The *physical* sub-system consists of the man-made terrain. As proffered by the Joint Warfare Analysis Center, "Cities are artifacts. Humans design, build, maintain, and alter them – by and to plans. <u>All</u> aspects of the urban terrain – the location, size, and materials making up the physical components are recorded and archived… And that makes cities the most understandable and militarily exploitable…"[71]   While this is true for urban areas under government control, it is not always the case in the unintended and unregulated slums of the developing world. Although the relationships and nodes in these slums are harder to discern, they still exist within the context of a terrain that can be sorted into rough categories that have operational and tactical relevance.

"Terrain zones" are a useful frame for assessing the physical structure and its impact. One method of distinguishing terrain zones is by function, distinguishing between administrative, industrial, commercial and residential areas.[72] While this distinction is useful,

airmen are better served by thinking in terms of structural height and density. This approach gives direct insight to the challenges for aerospace power functions and associated TTPs. The higher and more densely packed the structures, the more difficult it is to conduct surveillance, counterland, command and control and other aerospace functions. Additionally, classification by height and density provides insight to the probable functional areas of the city without risking mirror imaging. For example, "residential" implies suburban housing developments to most airmen, which suggests a type of order and structural character that is inconsistent with much of the world. Residential in Seoul, South Korea, means high-rise apartment buildings, while residential in Aden, Yemen, means tin and clapboard shantytowns.[73]
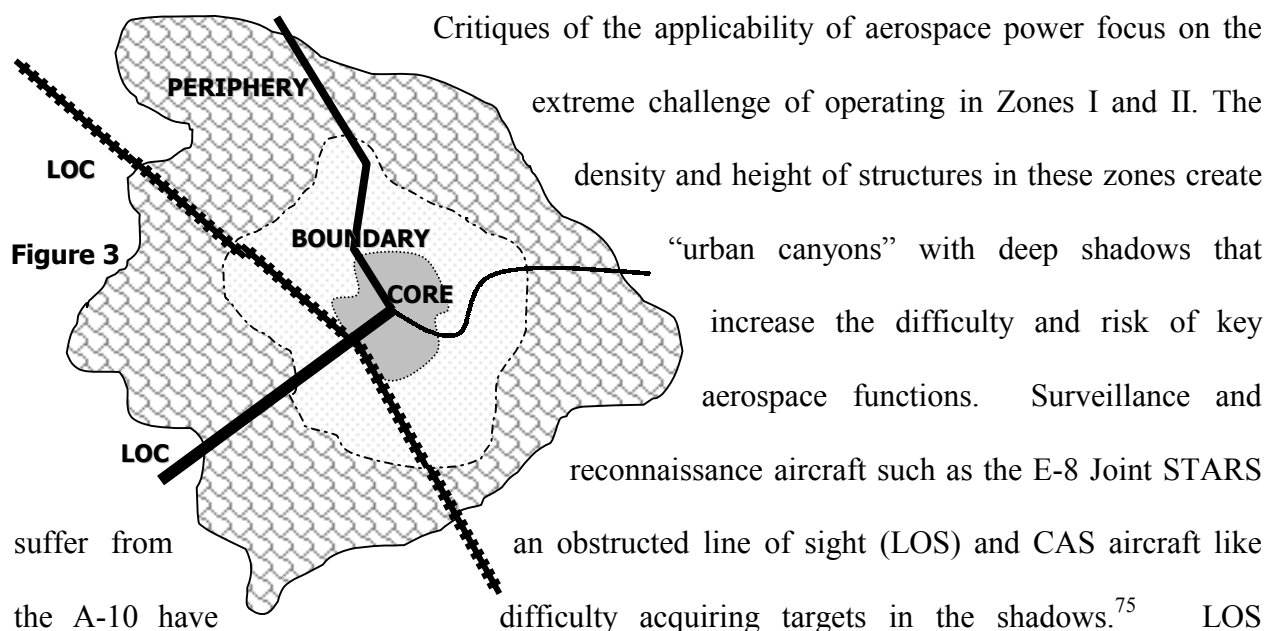
To the benefit of airmen, rigorous research on terrain zones has already been initiated based on the study of fourteen diverse cities and the seven zone types shown in Figure 2.

ZONE	DESCRIPTION	CITY AREA
		Figure 2
I.	Attached and closely spaced buildings	Core
II.	Widely spaced high-rise office buildings	Core and periphery
III.	Attached houses	Boundary
IV.	Closely space industrial/storage buildings	Core and LOCs
V.	Widely spaced apartment buildings	Periphery
VI.	Detached houses	Boundary and periphery
VII.	Widely spaced industrial/storage buildings	Boundary and LOCs [74]

Each of the zones described here tend to be located in certain areas of the city. As indicated in the simplified graphic of Figure 3, the core is the heart of the city, normally located at the center of the urban area and home to the most important economic, political and social structures—profitable for strategic attack. The boundary links the core to the periphery, usually consisting of critical LOCs and a mix of industrial, commercial and residential structures. The periphery extends out from the core, transitioning into the surrounding landscape. The periphery can be an orderly mix of functional areas or an unruly sprawl that exceeds the capacity for governance.

LOCs intersect the areas and serves as locus for industrial and commercial functions—lucrative relationships for counterland missions.

Critiques of the applicability of aerospace power focus on the extreme challenge of operating in Zones I and II. The density and height of structures in these zones create "urban canyons" with deep shadows that increase the difficulty and risk of key aerospace functions. Surveillance and reconnaissance aircraft such as the E-8 Joint STARS suffer from an obstructed line of sight (LOS) and CAS aircraft like the A-10 have difficulty acquiring targets in the shadows.[75] LOS limitations also make command and control difficult, and can mitigate weapons effect due primarily to the high attack angles. These critiques are valid, particularly when the enemy is conventional and dependent on many of the nodes that exist at the core. It is not as limiting; however, when one considers that only 1-3% of urban areas are characterized by Zone I and II terrain, and that these zones dominate in the developed cities where airmen are less likely to fight.[76] In fact, over 60% of urban areas consist of Zones V and VI where height and density are not as limiting for airmen. It is also operationally significant because Zones V and VI are where the urban system becomes increasingly decentralized and the relationships between subsystems more subtle. In terms of risk, the zones also impact threat. Zones I – IV make the employment of radar-guided SAMs and AAA more difficult due to radar clutter and field obstruction.[77] Open areas are necessary for these systems, such as Zones V – VII. Importantly for airmen, all zones allow the employment of small arms and MANPADS. *Modern* cities tend to have robust cores

Figure 3 labels: PERIPHERY, LOC, BOUNDARY, CORE, LOC

and peripheries, all under government control. *Primitive* cities tend to have small cores and sprawling peripheries absent government control. Many cities in the developing world are dualistic with small *modern* cores and unintended *primitive* peripheries.

The *functional* sub-system is vulnerable to manipulation by aerospace forces. It consists of the networks that enable the city to persist, inhabitants to prosper and the enemy to survive. The functional sub-system includes the services, transportation, communication and utility networks that enable resources to flow throughout the city. The service network consists of government buildings, universities, diplomatic offices, medical facilities and other activities that provide for governance and basic human needs. For the airmen, this network may represent lucrative targets for attack, such as a police headquarters; however, it also includes facilities and activities rightfully protected by the LOAC. Roads, subways, waterways, railroads and sea and airports are a few of the elements of the transportation network. The US and its adversaries rely on these links to move forces, weapons and supplies. The Mogadishu International Airport was critical to airlifting and staging supplies and forces during Operation RESTORE HOPE in Somalia. In Seoul, the Han River bridges serve as chokepoints, potentially channeling refugees and forces.[78] The transportation network is the most appropriate focus for air interdiction.

The communication network controls the flow of information through the information domain. It consists of telephones (wire and cellular), television, print media, radio and the Internet.[79] It can be manipulated by both aerospace power and potential enemies, effecting the perceptions of non-combatants and combatants alike. The utility network provides energy, water and sanitation. While the energy, or power network is often a lucrative target for strategic attack because of the effect it can have on the communication and services networks, disruption can have serious, unintended consequences. Each network is also critical to the non-combatants who

are dependent on utilities for cooking, heat and sanitation. Their crippling can lead to the outbreak of diseases that will undermine US objectives regardless of whether the operation is part of MTW or MOOTW.

There are formal and informal variations on each of the functional sub-systems that determine whether a city is *modern* or *primitive*. *Modern* cities have formal sub-systems, which are actually more vulnerable to exploitation by aerospace forces. They tend to be characterized by centralized administration, industrial or post-industrial technologies and identifiable links and nodes. The Washington, DC metro, for example, is managed by large bureaucracy, utilizes advanced computer technologies and consists of a defined network of rail lines and transfer stations. Formal sub-systems do not require direct observation given their common characteristics, the availability of documentation on their operations and their susceptibility to remote sensor surveillance and reconnaissance. Informal sub-systems characterize *primitive* cities. They are not as knowable because they exist outside the reach of government. They are characterized by decentralization, often including the absence of any central managing authority. Primitive or adaptive technology dominates, and the network generally consists of patterns of individual or small group activity. Nodes are highly decentralized or may not exist at all. The informal sub-systems are also more survivable under conditions of turbulence and conflict.[80] The periphery of Karachi, Pakistan, for example, is a seemingly endless sea of urban squalor. There is no public transportation, power and water are infrequent, trash is piled high in the streets, and lawless sectarian groups fight in the streets daily.[81] There are no blueprints for this part of town and points of leverage in the system are not readily discernable. Given the subtly of relationships, direct surveillance and reconnaissance, such as human intelligence (HUMINT), are essential to understand and ultimately exploit the informal sub-system.

The physical and functional character of the urban battlespace is irrelevant without the human dimension—the *social* sub-system. The social sub-system includes a wide range of variables to include culture, demographics, religion and history. A society can be overwhelmingly complex unless sorted into manageable types. At the risk of oversimplification, the "human architecture" of cities can be divided into three rough types: hierarchal, clan and multicultural.[82]

Hierarchical cities are those airmen know best. They are characterized by a unified citizenry that live according to agreed rules of interaction.[83] The city consists of chains of command that operate within an accepted legal framework.[84] *Modern* cities are hierarchal. Most of the cities of North American and Europe qualify, as do many in Asia such as Singapore, Kuala Lumpur and Tokyo. At the opposite end of the spectrum are clan cities that manifest from rapid urban growth and associated impoverishment.[85] Relationships are governed by loyalty and revenge. Restless, young men fight over limited resources and control of the government. Clans form and fight, while many citizens simply struggle to survive the crossfire. Hatred is at the core, and it is alarmingly persistent and resilient. Airmen who enter a fight in a clan-based urban system will find it difficult to distinguish friend from foe, identify patterns of activity and determine points of leverage to manipulate. Clans dominate in *primitive* cities. The examples are many: Kinshasa, Republic of Congo; Dushanbe, Tajikistan; and areas of Lagos, Nigeria. Multi-cultural systems exist between these extremes in which "contending systems of custom and belief, often aggravated by ethnic divisions, struggle for dominance. They are, by their nature, cockpits of struggle."[86]

Multi-cultural cities might contain the pressure for conflict through a robust hierarchy, but they cannot eliminate the struggle for power among ethnic, religious and/or criminal groups.

Clan-type interactions can gain momentum and drag the city into brutal violence. Jerusalem is a good example of a multi-cultural city that oscillates between hierarchal order and clan-oriented conflict. Sarajevo is an example of city that descended into a factional hell.

Airmen now have a framework for the urban system with operational implications. At one end of the spectrum are cities with ordered zones, formal infrastructure and hierarchal citizenry. These *modern* cities consist of highly knowable sub-systems with definable relationships (links) and exploitable points of leverage (nodes). At the other end are cities with sprawling peripheries, informal infrastructure and clan citizenry. These *primitive* cities consist of sub-systems that can be extremely difficult to understand due to subtle relationships and the distinct absence of exploitable nodes. Airmen must recognize that many cities, indeed most, reflect *modern* and *primitive* areas existing side-by-side as in Lima, Peru; Mexico City, Mexico; and Beijing, China.

Threat

The threat is an indispensable component of the battlespace. Our framework of the battlespace is completed by considering two general threat types: conventional vs. unconventional. Conventional threats tend to be organized and trained based on US or former Soviet Union models.[87] They have definable chains of command, use combined arms tactics and employ more technologically advanced, or at least larger caliber, weapons. The Iraqi Republican Guards, the North Korean Army and the Chinese People's Liberation Army are good examples. Although capabilities vary widely, conventional forces tend to fight in urban areas with stiff defenses and muscular firepower focused on holding terrain against an attacking force.[88]

Unconventional forces include terrorists, criminal gangs and insurgents. Organization can range from centralized and overt to decentralized and covert.[89] Terrorist and guerilla tactics

dominate, using primarily light arms. They challenge our understanding of objectives and values, use military technologies in surprising ways and employ unpredictable operational concepts and tactics.[90] Unconventional forces are not restricted by similar warfighting rules, allowing them to use non-combatants for cover and concealment. Unconventional forces are not as dependent on the urban system, nor are their nodes and relationships easily identifiable. The Viet Cong were heavily dependent on supplies coming down the Ho Chi Minh trail, which was resistant to attack given the decentralization of nodes. This does not imply, however, that airmen should sit out a fight against an unconventional foe.

Battlespace Matrix

Cross-referencing city type against threat provides a framework for developing operational art and achieving operational effects. The baseline framework with examples is again provided in Figure 4. Warfare in a modern city against a conventional force plays to contemporary nodal and parallel approaches to achieving direct operational effects through aerospace functions. Air Force doctrine, training and weapons are optimized for this fight. Warfare in a primitive city against an unconventional force is put forth as the domain of ground forces conducting tactical engagements. This is the fight the Marines are preparing for through their series of Urban Warrior programs. As shall be asserted more fully in the next section, aerospace power can achieve operational effects here as well, but primarily indirectly through cumulative effects resulting from attacks on relationships. Combat with a conventional force in a primitive city, or a fight with an unconventional foe in a modern city, require combining nodal and non-nodal operational concepts and effects. The real challenge will be for airmen to fight in cities such as Karachi where both city and threat types coexist.

| Battlespace Framework | CITY TYPE | Figure 4 |
	Modern	Primitive
Conventional Force	Nodal Attack Direct Effects	Nodal and Non-Nodal Attack Direct and Indirect Effects
Unconventional Force	Nodal and Non-Nodal Attack Direct and Indirect Effects	Non-Nodal Attack Indirect Effects

This framework is not an end. It is a starting point for developing and applying an understanding of the urban battlespace. It demands airmen operate in an urban battlespace with a knowledge of the conditions and how these conditions relate to operational art and effects. Airmen may find themselves in future years fighting in Bogotá, Columbia; Jakarta, Indonesia; or Bishkek, Kyrgzstan. When engaging in these volatile cities and others, airmen must appreciate what is knowable and unknowable, what is ordered and disordered and what is related and unrelated.

When joining the urban fight, what should airmen achieve and how should they go about it? This section tackles these questions by delineating elements of operational art vital to achieving effects that will accomplish command objectives. Focus remains at the operational level. Operational art must fuse principles of war and MOOTW due to the unique nature of warfighting in the urban battlespace.

Operational Level

The tenets of aerospace power allow airmen to impact all levels of war simultaneously or as part of a single mission.[91] Urban fights occur at the strategic, operational and tactical level. Effects are the determining factor, not weapons or targets.[92] Airmen of the 28th Bomb Wing operating the B-1B Lancer are not confined to the strategic level because their weapon system is historically considered strategic. 8th Fighter Wing airmen from Kunsan Air Base, South Korea, may destroy a truck unloading munitions near a North Korean position in Inchon to achieve a tactical effect. In the same mission, the F-16C two-ship might strike a bridge off-ramp across the Han River, resulting in the isolation of North Korean forces to achieve an operational effect. The potential to transition across levels is magnified in cities because tactical engagements can have far reaching implications due to the presence of noncombatants, media, nongovernmental organizations and public perceptions. Moreover, the *strategic value* of cities ensures that tactical and operational actions will have greater meaning.

The operational level "determines WHAT we will attack, in WHAT order, and for WHAT duration."[93] It is at the operational level that air campaigns are planned, conducted and sustained. For airmen, the Joint Air Operations Plan (JAOP) executed through the ATO is the principle output.[94] The operational level links tactical engagements to the strategic objectives.

Tactical engagements deal with how we fight (TTPs and targets), while the strategic level addresses "WHY and WITH WHAT we will fight and WHY the enemy fights us."[95]   The decision to engage in urban warfare should be made at the strategic and then operational level. Given the inherent challenges, commanders should avoid urban fights without a clear strategy linked to national objectives. This ideal is not always embraced by reality. Urban fights can and do emerge as a result of deteriorating situations. Airmen providing flood relief in Mozambique during Operation ATLAS RESPONSE, for example, might have unexpectedly come under fire from marauding gangs bent on hording relief supplies. Recognition of this potential can work toward keeping the decision at the right level regardless of whether the fight is a MTW or MOOTW.
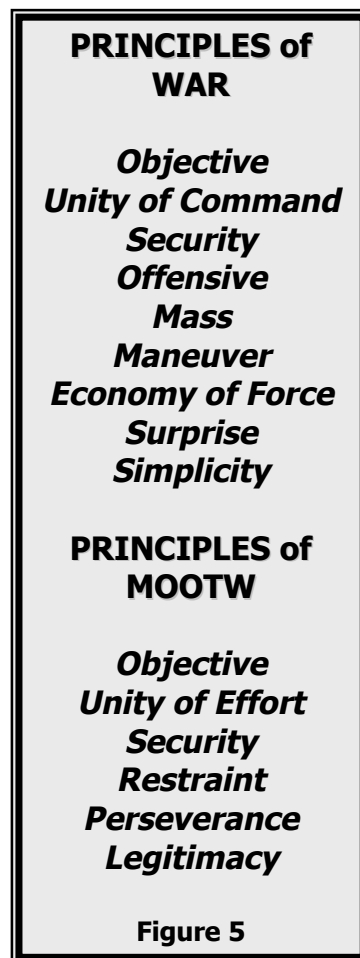
Operational Art

Operational art guides the WHAT of urban combat. It is the process of planning and sustaining operations to meet strategic objectives; it is guided by the WHY from the strategic level and implemented by the HOW at the tactical level.[96]   The keys to effective operational art in the urban battlespace are in contention, suggesting a need to return to those principles that guide operations regardless of the level.   Joint and Air Force Doctrine distinguish between *principles of war* and *principles of MOOTW*. When operating in the urban battlespace, airmen must appreciate that this is an artificial distinction. Urban fights are almost always both. General Charles C. Krulak, former USMC Commandant, is widely quoted for terming this multi-mission reality the "three-block war." In one urban zone, airmen "will provide food, care and comfort for an emaciated child."   In the adjacent zone, airmen will be separating angry mobs or warring clans. In a third zone, airmen will engage in intense fighting with a hostile force. Accordingly, airmen "will need the flexibility to address a wide variety of crises."[97]   The necessity of fusing

principles exists because peacekeeping escalates to combat (Sierra Leone) and theater war involves refugees (Kosovo).

The fusing of principles is not an intractable problem unless airmen cling to the idea that MTW and MOOTW are mutually exclusive. Three principles share the same purpose, while eight other principles of war can be shaped by the remaining MOOTW principles (Figure 5). The challenge is to link an understanding of principles from an airman's perspective to our knowledge of the urban battlespace.

The principles of *objective*, *unity of command/effort* and *security* are shared by MTW and MOOTW. For urban fights, the *objective* must not only be crystal clear, but it must appreciate that aerospace power can pursue operational objectives directly, particularly in the modern city. Urban objectives can span from defeating a conventional foe to reopening a LOC closed by gangs bent on disrupting relief operations. *Unity of command* and *effort*

PRINCIPLES of WAR
Objective
Unity of Command
Security
Offensive
Mass
Maneuver
Economy of Force
Surprise
Simplicity
PRINCIPLES of MOOTW
Objective
Unity of Effort
Security
Restraint
Perseverance
Legitimacy
Figure 5

share the intent of uniting efforts to accomplish objectives. In the urban setting, it involves the centralized control of military forces <u>and</u> the building of consensus among non-state actors. Given the multi-mission nature of the battlespace, the centralized control and decentralized execution of aerospace power is especially vital to prevent the fragmentation and the dilution of effects.[98] *Security* enables freedom of action in MTW and MOOTW. The principle must be extended in the urban environment to include protecting forces, noncombatants, civilian agencies and information from potential adversaries.[99] Airmen must anticipate threats to security from

conventional and unconventional threats. This is particularly true "during peace support or crisis situations when forces operate from austere and unimproved locations, in small units, or in crowded urban settings."[100]

The remaining eight principles of war are tempered by the three additional MOOTW principles.[101] The MOOTW principle of *restraint* essentially embraces the warfighting rules outlined earlier: sensitivity to civilian casualties and restrictive ROE. The restrictiveness of each tends to decrease as airmen transition from MOOTW to MTW; however, the key is continuous reassessment based on objectives. The inherent flexibility and versatility of aerospace power allows airmen to increase or relax restraint based on command guidance. The development of measured firepower (scalable munitions) and non-lethal capabilities will increase versatility. Restraint is linked to the principles of war by necessitating the prudent and judicious use of other principles, particularly mass, maneuver and economy of force.[102]

Urban fights tend to be protracted. *Perseverance* is always an imperative. The degree to which it is necessary is a function of objectives, but it is heavily influenced by the participation of outside polities, diplomats and nonstate actors. Concurrent, ponderous efforts to negotiate cease-fires or impose sanctions, for example, will require airmen to be "patient, resolute and persistent," particularly when dealing with members of the local populace.[103] Aerospace power is perseverant. As clarified in Air Force Basic Doctrine, aerospace "power's inherent exceptional speed and range allows its forces to visit and revisit wide ranges of targets nearly at will."[104] Airmen do not occupy terrain—they dominate space and time. Perseverance is not unique to MOOTW. Rather the qualities of resolve and endurance are equally relevant to offensive action to sustain initiative or maneuvering through the battlespace. During Operation PROVIDE PROMISE, airmen airlifted or dropped humanitarian relief supplies in Sarajevo and

other Bosnia cities with perseverance over a three-year period, simultaneously maneuvering through the battlespace and massing effects.[105]

Underpinning all urban operations is the condition of *legitimacy*, particularly given the need to gain and sustain the cooperation of noncombatants and other non-state actors. Legitimacy will always hinge on the ability of airmen to apply aerospace power in a manner consistent with the "new American way of war." The complexity of the urban battlespace necessitates s*implicity* in MTW and MOOTW. Airmen must also be resourceful due to the multi-mission nature and dynamic problems of the urban battlespace. Simplicity allows airmen "the freedom to creatively operate."[106]

This discussion represents a few among many ways that principles should be integrated. It also overlooks other keys to operational art being proposed by the joint force to include synergy, simultaneity and depth, anticipation, balance and others.[107] These principles may prove to be equally valid; however, airmen should recognize that the time-tested principles of war and emergent principles of MOOTW serve as a strong starting point. The principles are a guide, not a checklist. They are interrelated, not exclusive. Fusion results in "universally true and relevant" principles that form a more lasting basis for operational art in the urban fight.[108]

FOUR	URBAN EFFECTS

Airmen are artists with a purpose—operational effects. Aerospace power produces effects to achieve operational and strategic objectives based on operational art. The core effect airmen should pursue in urban warfare is *battlespace control*. All other effects spring from the overarching, desired outcome of controlling the urban battlespace to enable freedom of action by the joint force as well as critical state and non-state actors.[109] Control is directed against the sub-systems and threats of the battlespace. Effects will be realized directly or indirectly depending on the character of the battlespace and target selection. Airmen can cause these effects through existing aerospace power functions.
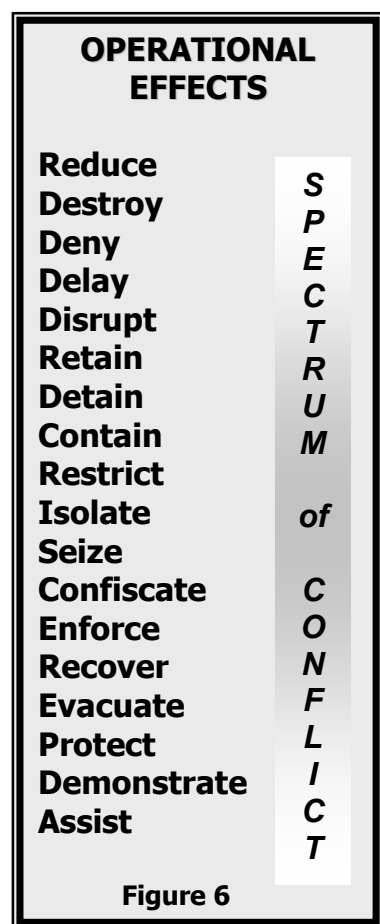
Control embraces all other relevant sub-effects. Airmen are reasserting control over a deteriorated situation by channeling crowds in a MOOTW. Airmen achieve control over an enemy by isolating it from reinforcements in MTW. The most important sub-effects are revealed by history and embraced by contemporary joint doctrine, but only for MTW. Even though effects are equally relevant to MOOTW, joint and service doctrine neglect to discuss effects and instead focus on operation types only. The multi-mission nature of urban operations and the asymmetric force strategy demand a focus on effects across the spectrum of conflict.

Full Spectrum Effects

Currently, five effects have been identified in warfighting doctrine: isolating, retaining, containing, denying and reducing.[110] Of these, isolation of the adversary has been consistently identified as paramount to operational success. A study of 22 urban battles in the last century by the USMC revealed "even partial isolation of the defenders resulted in attackers enjoying a success rate of 80 percent. Conversely, attackers won only 50% of the battles in which defenders were not significantly isolated, and those victories came at great cost."[111] The battle for Hue in

1968 is an example of a victory at great cost because the NVA in the Citadel were never cut off from their supply lines. Isolation is equally valid in lower intensity operations. Aerospace power sought to isolate Somali warlord Muhammad Farah Aideed by conducting counterinformation missions against his Radio Mogadishu broadcasts. Airmen dropped leaflets, broadcast messages over loud speakers and conducted a direct attack on the radio station to disable the adversary's information operation.[112] Similar examples can be offered for the remaining four effects, suggesting value for application across the spectrum of conflict.

MOOTW operations can also be refined to reflect an effects-based approach to urban combat instead of one based on operation types. Joint and service doctrine outline an impressive list of operation types, including arms control, combating terrorism, counterdrug operations, sanctions enforcement, enforcing exclusion zones, ensuring freedom of navigation, humanitarian assistance, counterinsurgency support, noncombatant evacuation operations (NEO), peacekeeping, recovery operations, shows of force, strikes, raids and several others. These are not effects, but they can be coalesced into an array of effects that include the five basic warfighting effects already listed. For example, strikes and raids are intended to "inflict damage on, seize, or destroy an objective."[113] Seizing and destroying are the effects! A strike is meaningless without a desired outcome. Recasting each of these operation types as effects results in the following outcomes with examples (Figure 6): confiscate (conventional arms in Port-au-Prince Haiti); detain (North Korean defector and

OPERATIONAL EFFECTS	
Reduce	S
Destroy	P
Deny	E
Delay	C
Disrupt	T
Retain	R
Detain	U
Contain	M
Restrict	
Isolate	of
Seize	
Confiscate	C
Enforce	O
Recover	N
Evacuate	F
Protect	L
Demonstrate	I
Assist	C
	T
Figure 6	

aircraft); disrupt (Iraq armored forces enroute to Khafji); enforce (no-fly zones over Iraq, including the cities of Mosul and Irbid); restrict (Liberian rebels from reaching NEO landing zones in Monrovia); recover (downed airmen or injured soldiers in Mogadishu); evacuate (Embassy personnel in Tirana, Albania); protect (Marsh Arabs in As Samawah, Iraq); assist (Columbian military in drug war); and demonstrate (Operation VIGILANT WARRIOR to Kuwait).

Direct and Indirect Effects

The battlespace matrix (Figure 4) clarifies whether operational effects can be obtained directly or indirectly. Direct operational effects are those that result immediately in time and space from application of aerospace power.[114] They are more readily obtained against modern cities and conventional threats due to the robust availability of key nodes and the more explicit nature of relationships. Effects can also be predicted with more accuracy when the relationships between sub-systems are known. An F-15E Strike Eagle achieves a direct effect when it attacks a telephone repeater station in Baghdad that disrupts Republican Guard command and control. Indirect effects flow out of direct attacks and are delayed in time or removed in space. For example, the same F-15E attack may subsequently delay enemy maneuver and enable their eventual containment. Indirect effects are more difficult to predict given the highly complex nature of the connections between sub-systems and threats; however, "general predictions can be made that have successfully guided aerospace strategy in conflicts for World War II to Operational ALLIED FORCE."[115]

Operational effects can also be achieved indirectly as the result of cumulative tactical effects. In primitive cities against unconventional enemies this approach may be necessary due to the lack of knowledge about sub-systems. As previously asserted, the system and threat exist

outside government control and may actually be non-nodal with unpredictable, inconspicuous relationships. Microwave towers were not essential to command and control in Kigali during the 1994 civil war. Rather, there were hundreds of individual thugs and small units with radios operating out of shacks and trucks. Achieving the disruption of command and control would have required persistent, tactical engagements or developing a more creative, less node-dependent approach. The primitive city and unconventional threat make predicting effects even more elusive. Achieving operational effects through cumulative tactical engagements also risks a return to attrition style warfare if it is assumed that only ground forces are capable of being successful at massing effects at the tactical level. The speed, range and flexibility of aerospace forces, complemented by accuracy and precision, allow airmen to quickly obtain mass.[116] Therefore, an asymmetric force strategy allows aerospace forces to achieve operational effects through tactical engagement without necessitating close combat. The primitive setting and unconventional foe will often necessitate joint force operations to achieve operational effects; however, they do not turn airmen into spectators.

Functions and Effects

Airmen can employ the functions of aerospace power to achieve operational effects across the spectrum of conflict. Every function is worthy of thorough analysis given the important contribution it can make to the urban fight. Air refueling enables counterair missions to achieve enforcement; navigation and positioning enables strategic attack missions to destroy; special operations employment can protect or detain; and combat search and rescue can recover and evacuate. Research has revealed that four functions are acutely vital to urban fights and also the most challenging to perform: intelligence, surveillance, reconnaissance and counterland.[117]

For all effects, intelligence, surveillance and reconnaissance (ISR) is indispensable.[118] ISR enables understanding of the urban battlespace, allowing airmen to discern the appropriate target for the desired effects. ISR is far more demanding in the urban setting due to poor LOS, intense clutter and the intermingling of non-combatants.[119] Even in a primitive city; however, airmen of the 55th Wing, Offutt AFB, flying the RC-135 can provide signals intelligence to uncover a pattern of communications activity that becomes exploitable by the counterinformation mission.[120] ISR also has the potential of "seeing" all the battlespace to include subsurface command posts, munitions storage sites and supply conduits through the development of ground-penetrating radars.[121] Moreover, ISR can provide moving target information using the Joint STARS, which is critical to the ability to sustain the offensive and orient interdiction missions. The value of overhead collection using satellites, the U2 Dragon Lady, the RQ-4A Global Hawk Unmanned Aerial Vehicle (UAV), RQ-1A Predator (UAV) and other joint force assets can not be underestimated. UAVs will prove increasingly important in the future given their ability to linger over an area—vital when primitive or unconventional features exist. HUMINT will gain importance as the enemy becomes increasingly decentralized and the system more informal. The complex urban battlespace will demand multiple sensors, including humans, that can effectively interact, share data and cue aerospace platforms. The current challenge and appropriate area for technological development is the dissemination architecture that will allow rapid dissemination of decision-quality data.

Counterland is tough.[122] According to Air Force Basic Doctrine, its main objectives are to "dominate the surface environment and prevent the opponent from doing the same."[123] Urban terrain complicates these objectives. First, the surface is only one of four battle spaces. Counterland in cities also demands attacks on the supersurface and in rare instances, the

subsurface. Moreover, cities make it hard to distinguish friend from foe, identify targets in clutter and achieve desired weapons effects. The city is full of movers. Combatants move among non-combatants and vehicles lack distinction. Even conventional weapons like an armored personnel carrier can be extremely difficult to pick out, especially when orbiting at 14,000 feet above ground level. Weapons cannot be effectively delivered at the high attack angles required by core terrain zones and excessive explosive yields risk unwanted collateral damage.[124]

Despite these hurdles, airmen must accept the counterland gauntlet or risk being relegated to the sidelines. Air interdiction (AI) is excellent for isolating an opponent by diverting, disrupting, delaying, or destroying the enemy's surface military potential before it can be used effectively against friendly forces.[125] AI can attack nodes and relationships in a manner that has direct operational effects. For example, AI prevented The Iraqi 5th Mechanized Division from reaching Khafji in 1991. AI might also be necessary against minute targets when the enemy is a guerilla using pedestrian bridges to move supplies between buildings or across a canal. Although CAS may have the most focused and briefest effects, it is often critical in the urban fight to ensure the success or survival of surface forces.[126] In the urban fight, the notion of "surface forces" must be expanded to include noncombatants. For example, CAS may be necessary to protect civilians in a hospital under siege by terrorists. This last idea is not ready for prime time. Since CAS "requires the highest level of integration between air and ground maneuver, specific procedures and training are required for air and ground terminal attack controllers and CAS aircrew."[127] It is time; however, to start thinking about procedures and training that provide CAS to relief workers and civilians without the detailed coordination required.

Airmen can enhance their ability to conduct the counterland function by placing emphasis on training and weapons. First, training is critical to developing proficiency in the diversity of the urban battlespace. A one-year urban CAS study by MAWTS-1 reveals persistent difficulties in acquiring and engaging targets in "Yodaville" despite consistent training.[128] The results do not argue for the discontinuation of counterland fighting; however, they do argue for regular training in a high fidelity setting like the one in Yuma, AZ. MAWTS-1 Marines recognize that even "Yodaville" does not provide sufficient training due to its emphasis on the modern and conventional. Nonetheless, it is available and unused by USAF airmen. Even airmen of the 25th Fighter Squadron at Osan AB, who know they will conduct AI and CAS in the urban environs of the demilitarized zone, rarely practice finding targets in the clutter. Airmen must balance the rural and urban in their training programs. Second, weapons must be developed that embrace the principles of scalable effects and non-lethal capabilities. Scaleable weapons allow aerospace power to be applied with "room-size" vice "building-size" effects.[129] Scaleable weapons will allow airmen of the 23rd Fighter Group out of Pope AFB to protect, enforce and isolate in support of friendly forces and non-combatants. As discussed earlier, non-lethal capabilities can enhance lethality, or they can be used to assist, contain and restrict in the context of MOOTW.

Airmen exist to cause effects that achieve objectives. Airmen fight for desired outcomes across the spectrum of conflict with the ultimate goal of battlespace control. Airmen get there through aerospace power functions that are currently optimized against the modern cores of Belgrade and Baghdad. These same functions can get the job done in the slum peripheries of Khartoum and Kabul only if airmen know the nature of battlespace and its implications for effects.

This effort recognizes the strong historical record of aerospace power in urban fights, but asserts a real need for an innovative approach based on the changing quality of American warfare. Airmen can apply their asymmetric strengths in the urban setting if they learn:

- Warfare demands blood and heroic effort…urban warfare takes more;

- The urban battlespace is a home…we do not destroy a city to save it;

- The way airmen fight impacts the endgame…the means can decide success;

- Fighting in cities is a choice…national objectives guide the decision;

- An operational focus is needed…emphasis is on battlespace control;

- Urban combat will occur…the strategic value of cities demands it;

- Rapid urbanization causes conflict…it makes cities less knowable;

- Urban strategic value is a function of location, symbolism and power;

- Urban warfare is an urban operation…urban operations are military operations;

- Urban warfare occurs when man-made features and noncombatants dominate;

- Urban warfare does not require presence…effects on the battlespace decide;

- Urban fights range the spectrum of conflict…situations deteriorate;

- Urban warfare has constraining rules…sensitivity and restrictive ROE impact airmen;

- Non-lethal force can enhance lethality and limit collateral damage;

- Urban warfighting rules increase risk and challenge targeting;

- Adversaries have no rules;

- Battlespace awareness is critical to operational success;

- The urban battlespace is a system with a threat…the fight is in five spaces;

- Urban systems range from modern to primitive…Dehli to Denver;

- Modern cities have knowable sub-systems with definable relationships and nodes;

- Primitive cities have elusive and adaptive relationships and nodes…hard to find;

- Threats range from conventional to unconventional…NKA to IRA;

- Unconventional forces are not as dependent on formal systems…the informal dominates;

- City and threat type characterize the battlespace with operational consequences;

- Airmen are ready for modern and conventional…not primitive and unconventional;

- Operational art and effects must be adapted to the diversity of the battlespace;

- Operational art must fuse principles of war and MOOTW…the fights are multi-mission;

- Art guides operational effects…effects are what airmen cause…they do it with vigor;

- Battlespace control at the operational level embraces all other effects;

- Airmen can achieve operational effects across the spectrum of conflict;

- Effects for war must be merged with MOOTW…operation types are not sufficient;

- Operational effects are realized directly and indirectly;

- Primitive and unconventional may force cumulative effects to achieve operational outcomes;

- Aerospace functions get the job done if warfighting rules and battlespace are understood;

- ISR and Counterland are critical to understanding, shaping and engaging the battlespace;

- Airmen must train for the fight with weapons that garner the effects;

Airmen win in concrete downtowns and clapboard slums.

Airmen know the urban fight.

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[1] The "new American way of war" rejects the "traditional strategies of attrition and annihilation that evolved from nineteenth century warfare." Air Force Doctrine Document (AFDD) 2-1, Air Warfare, (Air Force Doctrine Center (AFDC), 22 January 2000), 3.

[2] Ibid., 3.

[3] In making this argument, Major Mark Sumner, USMC, draws an appropriate analogy to the surgeon who must cut out the cancer while keeping the patient alive. "The Case for Joint MOUT Doctrine," (The MOUT Homepage, www.geocities.com/Pentagon/6453/jointmout.html), 2.

[4] AFDD 2, Organization and Employment of Aerospace Power, (AFDC, 17 February 2000), 11.

[5] Lecture by Major General Robert H. Scales, Jr., United States Army (USA), 'A MOUT Doctrinal Concept," at the Urban Operations Conference hosted by RAND Arroyo-Marine Corps Warfighting Lab (MCWL)-J8 Urban Working Group at the Joint Military Intelligence College, Bolling, Air Force Base (AFB), Washington, DC, 13-14 April 1999. Proceedings published in The City's Many Faces, edited by Russell W. Glenn, (Santa Monica, CA: RAND Arroyo Center, 2000),157.

[6] Contrary to the conventional wisdom, extensive empirical studies suggest that Americans will tolerate high casualties when vital interests are at stake, the cause is seen as consistent with American values, and when victory is likely. Other factors are discussed in Eric V. Larson, Casualties and Consensus: The Historical Role of Casualties in Domestic Support for US Military Operations, (Santa Monica, CA: RAND, 1996).

[7] This effort embraces the institutional shift within the US Air Force from "air" to "aerospace" with aerospace power defined as: the use of lethal and nonlethal means by aerospace forces to achieve strategic, operational, and tactical objectives. Ibid., 1.

[8] Adapted from a definition proffered by Colonel David A. Deptula in "Firing for Effect: Change in the Nature of Warfare," (Aerospace Education Foundation, Defense and Airpower Series, 24 August 1995), 5.

[9] AFDD 2-1, Air Warfare, 3.

[10] The downtown reference highlights my indebtedness to the pioneering work of Lieutenant General Norton A. Schwartz, USAF, and Colonel Robert B. Stephan, USAF, epitomized in their article, "Don't Go Downtown without Us: The Role of Aerospace Power in Joint Urban Operations," *Aerospace Power Journal* (Volume XIV, No. 1, Spring 2000), 3.

[11] Sun Tzu, The Art of War, in General Tao Hanzhang, Sun Tzu's Art of War: The Modern Chinese Interpretation, translated by Yuan Shibing, (New York, NY: Sterling Publishing, Co, Inc., 1987), 99. Major General Robert H. Scales, Jr., USA, "The Indirect Approach: How US Military Forces Can Avoid the Pitfalls of Future Urban Warfare," *Armed Forces Journal International*, (October 1998, from the Center for Army Lessons Learned webiste: http://call.army.mil/call//mout/scales/scales.html), 5.

[12] WRI, "Urban Environment," in World Resources 1996-97: A Guide to the Global Environment, (www.wri.org/wri/wr-96-97/ud_txt3.html), 1.

[13] United Nations (UN) Population Division, "World Urbanization Prospects: the 1999 Revision," (UNPD, New York, NY, 1999), 1.

[14] The US National Security Strategy identifies failed states as a threat to US interests. Failed states are those governments that are unable to provide "basic governance, safety and security, and opportunities for their populations, potentially generating internal conflict, mass migration, famine, epidemic diseases" and other effects that can weaken regional security. Whitehouse, A National Security Strategy for a New Century, (December 1999), 2.

[15] Ibid., 2.

[16] WRI, "Urban Environment," 1.

[17] Ibid., 3.

[18] Ibid., 4.

[19] Charles W. Kegley, Jr, and Eugene R. Wittkopf, World Politics: Trend and Transformation, (8th edition, New York, NY: Bedford/St. Martins, 2000), 126.

[20] Peter Wallensteen and Margareta Sollenberg, "Armed Conflict, 1989-98," *Journal of Peace Research* (Vol 36, September, 1999), 593-594.

[21] Ibid., 594.

[22] 32 civil wars and 1 inter-state conflict were underway at the start of 1998. Ibid, 594.

[23] Ibid., 594.

[24] According to A National Security Strategy, "States that fail to respect the rights of their own citizens and tolerate or actively engage in human rights abuses, ethnic cleansing or acts of genocide not only harm their own people, but can spark civil wars and refugee crisis and spill across national boundaries to destabilize a region." Whitehouse, 4.

[25] WRI, "Urban Environment," 2.

[26] Ibid., 3.

[27] Alan Vick, John Stillion, David R. Frelinger, Joel Kvitky, Benjamin S. Lambeth, Jefferson P. Marquis, and Matthew C. Waxman, Aerospace Power in Urban Environments: Exploring New Concepts, (Arlington, VA: RAND, Project AIR FORCE, 2000), 5.

[28] Three reasons adapted from an assessment of "The Role of Urban Areas in Military History" in the Handbook for Joint Urban Operations, (Joint Staff, J-8, Land and Littoral Warfare Assessment Division, The Pentagon, Washington, DC, 17 May 2000), I-5.

[29] Ibid., IV-31.

[30] Ibid., IV-39.

[31] AFDD-1, Air Force Basic Doctrine, (AFDC, September 1997), 79.

[32] The example of Port-au-Prince is taken from the Joint Handbook, I-7.

[33] Joint Staff, Handbook, II-2.

[34] Ibid., I-5.

[35] Example from Schwartz and Stephen, "Don't Go Downtown," 7.

[36] Joint Staff, Handbook, I-4.

[37] Remarks made in the briefing, "The City's Many Faces: Investigating the Multifold Challenges of Urban Operations," located in The City's Many Faces, 215.

[38] AFDD-1, Basic Doctrine, 8.

[39] For a solid discussion of the battles and the historical lessons, see MAWTS-1, Aviation Combat Element (ACE) Military Operations on Urban Terrain (MOUT) Manual, (8th Edition, Yuma, AZ: MAWTS-1, March 1999), 1-11 – 1-37.

[40] Joint Staff, J-8, Draft Joint Publication 2-06, Joint Urban Operations, (Pentagon, Washington, DC: Joint Staff, First Draft, July 2000), I-11 – I-13.

[41] MAWTS-1, ACE MOUT Manual, 1-26.

[42] These three primary political constraints on urban operations are highlighted in the Alan Vick's Aerospace Operations in Urban Environments, and discussed during an interview with author on 22 July 00 in the RAND Project Air Force offices, Pentagon City, VA). Subsequent interviews with Marines of MAWTS-1, particularly Captain James Adams, on 25 July 00, Yuma, AZ, reinforced the conviction that the law of armed conflict becomes increasingly important in urban operations due to infrastructure, the presence of noncombatants, the pervasiveness of the media, and the adoption by political leaders of this "new American way of war."

[43] Joint Staff, Draft Publication 2-06, III-143.

[44] Ibid., I-144 – I-145.

[45] US National Security Strategy, 1.

[46] Vick, Aerospace Operations in Urban Environments, 55, and years of professional military education.

[47] Interview with Dr. Ole R. Holsti, George V. Allen Professor of Political Science at Duke University, United State Air Fore Academy, 4 May 2000. Dr. Holsti is the author of over 130 books, chapters, and articles, including Crisis, Escalation, War and Public Opinion and American Foreign Policy. Books he has co-authored include Enemies in Politics and American Leadership in World Affairs: Vietnam and The Breakdown of Consensus.

[48] Joint Staff, Handbook, III-30.

[49] Richard T. Reynolds, Col, USAF, Heart of the Storm: The Genesis of the Air Campaign Against Iraq, (Volume 1, Maxwell AFB, AL: Air University Press, January 1995), 57. Based on remarks made by Col John A. Warden III during the presentation "Desert Storm Air Campaign," at the USAF Air and Space Doctrine Symposium, Maxwell AFB, AB, 6-8 April 1993.

[50] Vick, Aerospace Operations in Urban Environments, 58.

[51] Interview with Maj Michael Moore, 25 July 2000, MCAS, Yuma, AZ. During a highly informative tour of the Urban CAS Facility, Maj Moore explained the challenges and risks associated with target identification based on his extensive training experience as a ground Forward Air Controller (FAC) during several training events. The challenge of visually identifying a target in an urban complex is compounded by the stand-off distance required to avoid excessive risk to the FACs and airmen.

[52] Video of training missions provided by Captain Jim Adams of MAWTS-1 and a tour of "Yodaville" by Maj Moore reinforced the challenges of applying precise force in the urban setting without increasing the risk to airmen, 25 July 2000.

[53] Vick, Aerospace Operations in Urban Environments, 60.

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[54] Lieutenant General Stiner, USA, directed forces to use "the minimum use of power required" to win battles. This guidance unravel during mean fighting for the heavily defended La Comandancia compound. After the battle, US soldiers asserted that indirect fire was responsible for 21 US casualties and the fire the destroyed an adjoining Catholic neighborhood. MAWTS-1, ACE MOUT Manual, B-2.

[55] Notably, Operation UPHOLD DEMOCRACY would have included the A-10 in an urban CAS role for the first time as part of deliberate planning. According to pilots of the 55th Fighter Squadron, Shaw AFB, SC, the urban terrain posed challenges few had ever experienced to include the greatly compounded difficulty of positive target identification in and among the sprawling urban slums of Port-au-Prince. Interview with then Captain Robert Givens while serving as the squadron intelligence officer for the 55th Fighter Squadron. Also from MAWTS-1, ACE MOUT Manual, B-3.

[56] Vick, Aerospace Operations in Urban Environments, 61.

[57] AFDD-2, Organization, 18.

[58] Vick, Aerospace Operations in Urban Environments, 65.

[59] Ibid., 65.

[60] USAF, Global Vigilance, Reach and Power, 10.

[61] The joint definition of a system is: Any organized assembly of resources and procedures united and regulated by interaction or interdependence to accomplish a set of specific functions. J-7, Joint Staff, DoD Dictionary, Joint Electronic Library, February 1999.

[62] Peter M. Senge, The Fifth Discipline, (New York, NY: Currency Doubleday, 1990), 68.

[63] Ibid., 69.

[64] Ibid., 69.

[65] It is important to distinguish "usable" airspace because much of the urban airspace is cluttered with buildings, towers, wires, etc. Draft Joint Publication 2-06, Joint Urban Operations, I-7.

[66] Ibid., I-7.

[67] Ibid., I-7.

[68] Los Angeles, for example, has over 200 miles of storm sewers, which could actually be used for movement. Marine Corps Combat Development Center, Marine Corps Warfighting Publication (MCWP) 3-35.3, Military Operations on Urbanized Terrain (MOUT), (Washington, DC: Headquarters USMC, 1998), 1-3.

[69] Joint Staff, Joint Publication 3-13, Joint Doctrine for Information Operations, (Washington, DC: Joint Staff, 9 October 1998), GL-7.

[70] Adapted and modified from Draft Joint Publication 2-06, Joint Urban Operations, which likens the urban environment to a living organism. This metaphor is consistent with systems thinking. I-5.

[71] JWAC, Air Power in MOUT: A JWAC Experiment, (SAIC, CD-ROM, August 1998), Slide 4.

[72] Functional categorization is used by the USMC in MCWP 3-35.2 and the Urban Generic Information Requirements Handbook (GIRH), produced by the Marine Corps Intelligence Activity, December 1998.

[73] Observations based on authors multiple visits to Seoul in 1998/1999 and three day walking tour of Aden, Yemen, in 1995.

[74] The research was conducted by Dr. Richard Ellefsen, a geography professor at San Jose State University who also worked as a consultant for the Naval Surface Warfare Center and Aberdeen Proving Ground. The data was generated from detailed examination of maps, aerial photography, and visits. Dr Ellefsen picked his cities to reflect diversity in terms of population, geographic location, climate, terrain, port services, political importance, and development process. His research is effectively summarized and critiqued in Vick, Aerospace Operations in Urban Environments, 74-80.

[75] For a thorough discussion of the impact of terrain zones on aerospace functions and weapons effects, see Vick, Aerospace Operations in Urban Environments, 83- 117. Urban CAS training at the Urban Training Facility, "Yodaville," in Yuma, also reveals the difficulty of acquiring targets, such as tanks and armored personnel carriers (APCs), nestled between tall buildings. The results are captured in the ACE MOUT Manuel. The author's own walking tour of the facility on 25 July 2000 reinforced the training results.

[76] Ibid., 77.

[77] Ibid., 80.

[78] In June 1950, the destruction of the bridges substantially disrupted the momentum of a pressing North Korean Army. Unfortunately, it also trapped an entire South Korean division in the city core.

[79] GIRH, 47.

[80] Ibid., 47.

[81] Based on author's driving and walking tour of Central and East Karachi during a three day period in 1994.

[82] Adapted from the work of retired Army Lieutenant Colonel, Ralph Peters, "The Human Terrain of Urban Operations," (*Parameters*, Spring 2000), 4.

[83] Ibid., 5.

[84] Ibid., 4.

[85] Ibid., 8.

[86] Ibid., 5.

[87] MCWP 3-35.3, 2-3.

[88] Colonel Robert Stephan, "The Role of Aerospace Power in Joint Urban Operations," (Briefing slides, 3 November 1999), 4.

[89] Ibid., 4.

[90] Alan Vick, "Aerospace Forces in Urban Military Operations: Images, Missions, Environments," (Briefing slides at the conference, *The Role of Aerospace Power in Joint Urban Operations*, sponsored jointly by the Headquarters USAF Strategic Planning Directorate, Headquarters Air Force Special Operations Command, and Headquarters Air Combat Command Operations Directorate, March 1999). 5.

[91] Tenets include: centralized control and decentralized execution; *flexibility and versatility*; *synergistic effects*; *persistence*; *concentration*; priority; balance. The highlighted tenets are particularly vital for achieving multi-level effects. AFDD-1, Basic Doctrine, 23-27.

[92] Air Force doctrine embraces an effects-based approach to the traditional levels of war: "the focus at a given level of war is not on the specific weapons used, or on the target attacked, but rather on the desired effects. A given airplane, dropping a given bomb, could comprise a tactical or strategic mission depending on the planned results." AFDD-2, Organization, 2.

[93] Ibid., 3.

[94] Ibid., 2.

[95] Ibid., 2.

[96] AFDD-2, Organization, 3.

[97] Adapted from a quotation by General Krulak in: Lieutenant General Paul K. Van Riper, "A Concept for Future Military Operations on Urbanized Terrain," *Marine Corps Gazette*, (October 1997), A-2.

[98] According to AFDD-1, Basic Doctrine, "attempts to fragment the control and planning of air and space power will ultimately cost blood and treasure by diverting effort and impact." 23.

[99] Joint Staff, Handbook, III-13.

[100] AFDD-1, Basic Doctrine, 19.

[101] The Joint Staff Handbook offers a solid discussion of the principles of war and MOOTW on pages II-3 through II-14. My intent is not recount these in detail, but to suggest that members of all service should start looking at fusing principles for a single operation.

[102] AFDD 2-3, Military Operations Other Than War, (AFDC, 5 October 1996), 2, speaks to the need for the restricted use of force in the "judicious and prudent selection, deployment and employment of forces most suitable to the operation."

[103] Ibid., 2.

[104] AFDD-1, Basic Doctrine, 25.

[105] Example from Joint Staff, Handbook, II-14.

[106] AFDD-1, Basic Doctrine, 21.

[107] Draft Joint Publication 2-06, Joint Urban Operations, II-5 – II-9.

[108] AFDD-1, Basic Doctrine, 12.

[109] AFDD 2-1, Air Warfare, 4, states "controlling the battlespace means exercising the degree of control necessary in all media (land, sea, and aerospace, in both the physical and information domains) to employ, maneuver, and engage forces while denying the same capability to the adversary."

[110] Joint Staff, Handbook, II-10.

[111] MCWP 3-35.3, 1-17.

[112] Major J. Marcus Hicks, "Fire in the City: Airpower in Urban, Small-scale Contingencies," (Maxwell AFB, AL: School of Advanced Airpower Studies, Air University, June 1999), 84.

[113] Joint Staff, Handbook, II-18.

[114] AFDD 2-1, Air Warfare, 7.

[115] Ibid., 7.

[116] As stated in AFDD-1, Basic Doctrine, "today, a single precision weapon that is targeted using superior battlespace awareness can often cause the destructive effect that in the past took hundreds of bombs." 16.

[117] Interviews with numerous experts support the great need to focus doctrine, training and technologies on ISR and counterland. Among those supporting this are Captain Kevin Psmithe, USAF, HQ USAF/XP; Alan Vick, RAND Project Air Force; and the J-8 Land and Littoral Warfare Assessment Division..

[118] Intelligence provides clear, brief, relevant, and timely analysis on foreign capabilities and intentions for planning and conducting military operations. Surveillance is the function of systematically observing air, space, surface, or subsurface areas, places, persons, or things, by visual, aural, electronic, photographic, or other means. Reconnaissance complements surveillance in obtaining, by visual observation or other detection methods, specific information about the activities and resources of an enemy or potential enemy; or in securing data concerning the meteorological, hydrographic, or geographic characteristics of a particular area. AFDD-1, Basic Doctrine, 59.

[119] Vick, Aerospace, 84.

[120] Counterinformation seeks to establish information superiority through control of the information realm. Counterinformation creates an environment where friendly forces can conduct operations without suffering substantial losses, while simultaneously denying the enemy the ability to conduct their operations. Ibid., 53.

[121] Schwartz and Stephan, "Don't Go Downtown without Us," 7.

[122] Counterland involves those operations conducted to attain and maintain a desired degree of superiority over surface operations by the destruction or neutralization of enemy surface forces. Ibid., 48.

[123] Ibid., 48.

[124] Vick, Aerospace, 111-114 offers a solid discussion of the limitations of weapons effects.

[125] AFDD-1, Basic Doctrine, 48

[126] CAS consists of air operations against hostile targets in close proximity to friendly forces. Ibid., 50.

[127] AFDD 2-1.3, Counterland, (AFDC, 27 August 1999), 37.

[128] Interview by author with Major Michael Moore, USMC, Major Jeff Olander, USMC, and Captain James Adams, USMC, MAWTS-1, 25 July 2000.

[129] Vick, Aerospace, 111-114.